



Norman H. Bangerter
Governor
Dee C. Hansen
Executive Director
Dianne R. Nielson, Ph.D.
Division Director

State of Utah

DEPARTMENT OF NATURAL RESOURCES
DIVISION OF OIL, GAS AND MINING

355 West North Temple
3 Triad Center, Suite 350
Salt Lake City, Utah 84180-1203
801-538-5340

January 9, 1991

Mr. Ken A. Kluksdahl
Mine Manager
Tenneco Minerals
P.O. Box 2650
St. George, Utah

Dear Mr. Kluksdahl:

Re: Review of Revised Notice of Intention, Tenneco Goldstrike Project, M/053/005,
Washington County, Utah

The Division has completed its initial review of Tenneco's revised Notice of Intention to Commence Mining Operations for the Goldstrike Mine, received October 5, 1990. In general, the plan is very thorough and well organized. However, specific sections will require alteration or further explanation before the plan, as a whole, can be determined complete and technically adequate.

We understand that your consultant (JBR) has prepared a revised Environmental Assessment (EA) and Plan of Operations (POO) and presented it to the Bureau of Land Management (BLM) on December 19, 1990. This was prepared in response to the BLM's preliminary review comments. We have not had an opportunity to review those revised documents. The Division has been informed by the BLM, that they will soon be sending us their formal review comments for incorporation into this document. Consequently, please consider this a draft document. We will forward a revised joint review document upon our receipt of the BLM comments. Please respond to the following Division comments:

R613-004-105.3 Maps, Drawings and Photographs.

Drawing nos. GS-006 and GS-009, 1990 & 1992 Hydrology Maps, should be revised to clearly show the general direction of surface runoff flow (use arrows) from the watershed areas. Culvert sizes and locations should be clearly labelled on the maps as well.

Surface facilities shown on drawing GS-008 Project Development 1992, are the same as those shown on drawing GS-005 Project Development 1990, yet the plan states that one solution pond was enlarged and a new solution pond was added. Neither drawing contains labels for individual facility structures. If this document is to stand alone, a more accurate and descriptive drawing of the 1992 facilities layout should be submitted.

The document makes reference to the West Hassayampa Pit and the Peace Mine Pit, but neither pit is shown on any of the drawings in this submission. Will these pits be completely backfilled? If so, then what will be their location and what time frames have been designated for their use and eventual reclamation? In order for this document to stand-alone, these pits should be described in the text and/or graphically.

R613-004-106 Operation Plan.

The document states that the combined capacity of the pregnant pond, barren pond and fresh water pond is available for storm inflow by placing 24" spillway pipes between ponds (section 3.4). It is unclear whether or not this placement must be done manually or if these spillways are already in place. The overflow system should function without human intervention. The operator should clarify this point or modify the overflow system to be automatic.

Page 32, section 3.9, Runoff and Sediment Control - The plan contains a statement that round steel culverts are of adequate design to convey ditch runoff. A table with supporting hydrologic calculations and design assumptions should be included confirming the accuracy of this statement.

Page 33, section 3.9, (cont'd.) - A maintenance plan/schedule for all of the existing and proposed runoff and sediment control structures is not included in the operator's plan. Given the temporary nature of these structures designed to control surface runoff and erosion, the Division will require that a maintenance plan be developed and made part of the mining and reclamation plan.

Page 33, section 3.9 (cont'd.) - The operator's plan includes a statement that grades along Ditch #1 exceed 10 percent, and erosive velocities necessitate maintenance by Tenneco. Will this section still require maintenance once mining

operations cease and reclamation has been completed? Is this ditch presently armored? Are there plans to stabilize this section as part of the reclamation plan? The plan contains similar language concerning Ditch #2 draining runoff from watershed area B. The Division has the same concerns for the long-term integrity/stability of this drainage ditch. Why was Ditch #3 designed with armor/riprap in the critically sloped sections while Ditch #1 and #2 were not?

Page 36-38, section 4.2, Leach Pads - This section describes the proposed design details for the extension of Leach Pad #2. The State Health Department, Bureau of Water Pollution Control (BWPC), has expressed concerns regarding Tenneco's practice of end-dumped fill under the heap leach pads (differential settlement). Will this practice continue, or will Tenneco modify this construction practice as part of the pad expansion across Quail Canyon? The Bureau has also expressed additional concerns relative to the currently approved leak detection system implemented under the heaps at the Goldstrike mine. Will this system be modified to mitigate the Bureau's design concerns? Any changes or modifications to the above will need to be provided for incorporation into the revised plan.

Page 36 also indicates that Tenneco has obtained approval from the Department of Natural Resources, Division of Water Rights, Dam Safety, to construct the Quail Canyon Dam. The Division requests that Tenneco provide a copy of the formal approval notice from the Division of Water Rights. This will be made part of the revised mining and reclamation plan.

Page 43, Section 4.9, Runoff and Sediment Control - The revised plan indicated the new containment dam will have the capacity to impound 86 acre-feet of water and sediment. Supportive design calculations indicating how this volume was determined were not found in the plan. This information should be included and made a part of the supportive documentation of the design of this structure.

R613-004-106(5) - Operation Plan - Topsoil Salvage.

The Reclamation Plan shows the estimated total volume of salvaged topsoil to be 193,040 cubic yards which will be placed over 220 acres of disturbance resulting in a topsoil layer approximately 6 inches deep. A 6 inch layer over the entire disturbed area may not result in good revegetation success. Areas of critical revegetation (leach pads and waste dumps), may show greater success by being covered with at least 12

inches of topsoil. On other areas, a minimum of 6-8 inches will be acceptable. However, this may require leaving some areas without topsoil cover. Soils in some areas of the project may be amenable to revegetation without topsoil, provided soil amendments and treatments are used.

Of the 250 acres of proposed disturbance, 107 acres encompass leach pads and waste dumps approved in the original plan, these areas were approved for a topsoil depth of 8 inches; 29 acres encompass proposed dump areas, these areas will require a minimum depth of 12 inches of topsoil; 30 acres encompass pit areas (not to be reclaimed) and 84 acres encompass road and site facilities requiring a minimum of 6 inches.

The operator will need 115,084 yd³ of topsoil to reclaim the, already approved, heap leach and dump areas to a depth of 8 inches. Another 46,786 yd³ of topsoil will be required to reclaim the proposed dump area to a depth of 12 inches. The remaining acreage can be reclaimed with 67,760 yd³ of topsoil to a depth of 6 inches. A total of 229,630 yd³ of topsoil or substitute topsoil material, will be required to meet ultimate reclamation performance standards. This will amount to a deficit of 36,590 yd³ of topsoil.

This deficit could be addressed by utilizing one of the following:

1. Salvaging on site topsoil to greater depth;
2. obtaining off site topsoil or substitute topsoil material;
3. performing soil tests, demonstrating that overburden material, with amendment application, can be used as part of the soil planting medium.

The Division will need to coordinate with the operator and the BLM, to formalize the topsoil/substitute material application portion of the reclamation plan.

R613-004-109 Impact Assessment.

Safety berms around the open pits are mentioned in the document, but no berm design or location descriptions are given. The construction of these berms was not addressed in the reclamation cost estimate, implying that they are part of the

operation plan. The operator should clarify this point and provide design and location drawings for the safety berms.

The Padre and Basin Pits will not be backfilled and will consequently leave highwalls remaining. No written description of these highwalls was included in the document. The operator should provide a description of these highwalls in order for the Division to adequately assess their impact.

R613-004-110 Reclamation Plan.

Reclamation of the Goldtown Pit was not specifically addressed in the document. Reclamation of this area was indirectly mentioned in connection with the Contractor Staging Area, but it is unclear whether this will adequately reclaim the pit. The operator should clarify how the pit will be reclaimed or whether or not the reclamation of the Staging Area will totally reclaim the pit area.

Reclamation of the Sediment Dam via revegetation was not mentioned. If the operator wishes this structure to remain after final reclamation, revegetation steps should be taken to insure the long-term stability of this dam. The operator should address this in the reclamation plan.

Page 49, Section 6.2, Demolition and Disposal - The operator proposes to neutralize any residual cyanide in the solution ponds, then allow the ponds to evaporate to dryness. There is no mention in the plan to evaluate the concentrated evaporites or sediments remaining in the ponds upon dryness. The plan should be revised to allow for a detailed analytical evaluation of any significant quantities of deleterious residual material that may require removal and transport to an approved offsite disposal facility.

In Section 6.3 of the submission, the operator proposes to flush the heap leach pad with water until the cyanide concentration in the runoff is <5ppm according to the BWPC, then drain the heap and allow it to dry out. The time frame for this decommissioning is given in the reclamation cost estimate as 6-months. This time frame may not be realistic. The operator should provide information/calculations to support this estimated time frame and define "drained" and "dry" in quantifiable terms with respect to the leach pad system.

Reclamation of the topsoil stockpile areas after the topsoil is removed was not addressed in the submission. Portions of the Main Pit, Sediment Dam and Padre Pit stockpiles were included within the disturbed area boundary, but not the entire stockpile areas. These areas encompass an estimated 4 acres. The operator should include revegetation of these areas in the reclamation plan since they will be disturbed.

Page 51, Section 6.5, Drainage & Sediment Control - The plan indicates all drainage ditches will remain in place upon final reclamation. The culvert and diversion ditch along main haul road is to be maintained by the BLM following reclamation. A written commitment from the BLM will need to be made part of the plan confirming this statement.

Section 6.7 of the Reclamation Plan states that after the topsoil is placed, it will be ripped to a depth of 12 inches. Surety Section 8.5 states that the topsoil will be ripped to depth of 6 inches. The operator should clarify which depth will be used. A ripping depth of 12 inches is preferred.

The heap leach is to be neutralized, regraded, covered with 6 inches of topsoil, ripped to 12 inches, fertilized, mulched and seeded. These steps may not be adequate to establish plant growth over the heap leach due to the chemical composition or coarseness of the leached materials (minus 4 inch). Options include the topsoil prioritizing mentioned above.

R613-004-111 Reclamation Practices.

Page 52, Section 6.6, Topsoil Plan - The plan indicates the leach pad foundation slopes will extend to 300 feet and dozed topsoil may not fall to cover the entire slope. If it proves unfeasible to initially construct or ultimately regrade the leach pad foundation outslopes to a configuration allowing reasonable access for mechanized equipment, then the Division will require that the operator implement/design the foundation to provide for mechanized access upon final reclamation. This may involve the construction of a benched or terraced network to permit mechanical equipment access to push or regrade topsoil to a more uniform distribution over the outslopes upon final reclamation. The plan must be revised to reflect this requirement.

Upon review of Table 4.1-1, Mining Sequence, some questions became apparent regarding the mass waste balance figures. When the volumes of waste tons produced are compared to the emplaced volumetric figures the numbers do not add up correctly. The plan indicates that the Peace Mine and the Goldtown Pit are proposed to be totally backfilled upon final reclamation. However, the volume of wasterock listed on the table for backfill of these pits does not support this proposal. The Division questions where the deficit of waste rock will come from to backfill the these pits? Table 4.1-1 should be revised to clarify these discrepancies.

The Division requires that where practical and reasonable, pits be backfilled to the maximum extent feasible, leaving as small of an unreclaimed pit(s) as possible upon final reclamation. Has the operator evaluated and prepared the proposed mine plan development scheme to allow the smallest pit(s) to be left upon reclamation? Could the Peace Mine and/or a portion of the Goldtown pits be left open instead of the Basin and Padre pits? Would these pits be smaller than the proposed pits to be left unreclaimed? Could a portion(s) of the Basin and/or Padre pit be backfilled and reclaimed?

R613-004-111(6) Reclamation Practices - Slopes.

The operator indicated on page 50 of the plan, that leach pad slopes will be reclaimed to 2:1 overall. The Division will require that these slopes be reclaimed at 3:1.

Any slopes to be reclaimed at steeper angles will require that alternate slope stabilization techniques be implemented for the purpose of establishing an effective plant cover. The Division may grant relief from the 3:1 slope angles, but will not grant a variance from the 70% revegetation success standard.

Upon final reclamation, the Division recommends that the operator push the neutralized leached ore material off the liners, if necessary, to obtain final grades of 3:1 slopes. The material must first meet the neutralization standards required by the State Health Department.

Waste rock area slopes to be left at 1.8:1 slopes will not be acceptable, unless the operator is willing to apply supplemental slope stabilization techniques that will allow plants to achieve a similar cover as on the adjacent undisturbed areas. Such

techniques might include cross-slope furrowing or terracing, benching, netting, brush wattling, shrub or tree seedling installation.

R613-004-111(13) Reclamation Practices - Revegetation.

The Division will allow impounding structures (Padre & Basin pits, the sediment dam & Quail Canyon dam) to remain as part of the post-mining land use site, providing adequate reclamation is performed on them. Plant species adaptable to riparian areas should be planted on and in the remaining impounding areas. The operator will need to incorporate appropriate riparian vegetation species in to the reclamation seedmix. Riparian shrubs should be planted in areas where water availability will be most prevalent, around the bottom of impoundments. Grasses and forbs should be planted on the tops and side slopes of these areas to help in stabilization. Woody species should be avoided on the impounding structure itself (dam faces/outslopes). If pit bottoms are to impound water, then the operator must also demonstrate that this water will be of adequate quality for wildlife consumption.

R613-004-112 Variance.

Much of the Tenneco Plan was approved in 1988. The Division granted variances for certain areas of the earlier plan, which addressed highwalls and dump slopes. Areas, for which a variance still applies, include the Hamburg Pit, and portions of the Main and Padre pits. The waste dump slopes to be established northeast of the Padre Pit will require the application of alternate surface stabilization techniques if slopes are to be left at greater than 3:1.

The operator has requested a variance to Rule R613-004-111.9 to allow four impounding areas to remain after final reclamation. These areas are the Sediment Dam, the Quail Canyon Dam (leach pad foundation dam), the Padre Pit and the Basin Pit. The Quail Canyon Dam must remain in order to maintain structural integrity of the pad and to prevent contact with the heap leach materials, therefore, the Division supports granting this variance. Provided that the Sediment Dam is stabilized by revegetation we would accept this variance request. Because the Padre and Basin Pits will be the last areas mined, it will be difficult and costly to modify these pits to be non-impounding, therefore we also will grant this variance.

The operator has requested a variance to Rule R613-004-111.6 to allow reclaimed slopes on the southwest side of Hamburg Peak to remain at a 1.5:1 angle. The submission contains no other reference to this area in the text or in the drawings. The Division will grant the variance, but the operator will need to clearly identify this area and the reclamation techniques implemented, in the mining and reclamation plan.

The operator has requested a variance to Rule R613-004-111.7 to allow highwalls to remain at angles steeper than 45 degrees in the Main, Basin, Hamburg and Padre Pits. These highwalls would have slopes between 50 and 56 degrees. the operator estimates the Main Pit highwall to be 190 feet in vertical height and the Hamburg Pit highwall to be 320 feet in height. Estimates made using drawing GS-008 Project Development 1992, show the Basin Pit highwall with a maximum height of 290 feet and the Padre Pit highwall with a maximum height of 350 feet. These estimates of maximum height are generally limited to a small area of the pits. The operator has performed an assessment of slope stability for the Main, Hamburg, Hassayampa and Padre Pits which concludes that their slope designs are safe and stable. For that reason we will grant a variance for the Main, Hamburg and Padre Pit highwalls. The submission contains no reference linking the Basin Pit to the Hassayampa Pit, therefore, we will withhold our decision on granting a variance for the Basin Pit highwalls until the operator can clarify this issue.

R613-004-113 Surety.

The operator's Surety estimate is \$933,000 in 1993 dollars. Unit costs in this estimate are based on Tenneco's wage scale and experience with contractors, and the Means Facility Cost Data (1988). Certain portions of the estimate are acceptable, while other portions are lower than Division estimates.

Unit costs used in preparing the Division estimate were based on the Rental Rate Blue Book (4/90-9/90) and the Means Site Work Cost Data 1990. The Division estimate was also calculated using a 5-year escalation period instead of 3 years. The Division's preliminary estimate rounded in 1995 dollars would be \$1,051,000 (see attachment for details). This estimate is for the reclamation activities shown and does not include safety berms, topsoil stockpile areas, or a longer decommissioning process. The Division will seek concurrence and comment from the Department of State Health, Bureau of Water Pollution Control and the BLM regarding the adequacy of the heap decommissioning costs.

Page 10
Tenneco Minerals
M/053/005
January 9, 1991

R613-004-118 Revisions.

The Division has evaluated this proposal pursuant to this rule and has determined that the changes to the original notice of intention are significant. Consequently, the proposal will require a formal 30-day public notice pursuant to rule R613-004-116. Once the Division has made a tentative approval decision regarding the completeness of the revision application, a public notice will be forwarded to the appropriate newspapers for publication.

The operator will need to resolve these technical concerns before the Division can consider granting a tentative approval of this proposed revision. Thank you for your assistance and cooperation in completing this permitting action. Please contact me or D. Wayne Hedberg of the Minerals reclamation staff if you have questions or require assistance in addressing these technical concerns.

Sincerely,



Lowell P. Braxton
Associate Director, Mining

DWH/jb
Attachment

cc: Doug Bauer, BLM
Paul Carter, BLM
Don Ostler, BWPC
Debra Pietrzak, BLM
MNM053005.4

RECLAMATION ESTIMATE

Tenneco Minerals Company

Goldstrike Mine Washington County

M/053/005 November 7, 1990

Prepared by Utah State Division of Oil, Gas & Mining

Reclamation Details

***Tenneco time estimates & Division unit costs are used in this estimate

***Means Site Work Cost Data 1990 & Rental Rate Blue Book utilized

- Generator for decommission of heap leach (6 months)
- Labor for decommission of heap leach (Tenneco estimate)
- Miscellaneous reagents, supplies, vehicles, equip. for decommission
- Regrading Leach Pad #1 & #2, plant & pond area, Padre dump & road
- Ripping ponds to 24", roads, plant, crusher, & contractor sites to 12"
- Removing two culverts 21" x 80' each (Tenneco estimate)
- Hauling and placing topsoil by scrapers, dozers, & water truck
- Seeding, mulching, crimping, fertilizing or hydroseeding (Tenneco estimate)
- Construction supervision during reclamation (Tenneco estimate)

<u>Description</u>	<u>Amount</u>	<u>\$/Unit</u>	<u>Cost-\$</u>
Generator (Decommission)	6 mo	2,228	13,368
Labor (Decommission)	Tenneco Estimate		193,600
Miscellaneous (Decommission)	Tenneco Estimate		24,000
Regrading	1,126 hr	175.50	197,613
Ripping	118.8 hr	191.55	22,756
Culvert Removal	2 ea	100	200
Topsoiling	431 hr	679.91	293,041
Revegetation	Tenneco Estimate		98350
Supervision	Tenneco Estimate		29600
SUBTOTAL			872,528
+ 10% CONTINGENCY			87,253
SUBTOTAL			959,781
+ 5 yr ESCALATION(1.84%)			91,610
TOTAL			1,051,391

ROUNDED TOTAL IN 1995-\$

\$1,051,000